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perfect straightforwardness and high sense of duty, his generous sympathy and untiring helpfulness, marked him out as a man of singular charm and endeared him to a wide circle of friends who, while they admired him for his genius, loved him for the beauty and brightness of his character."

But I cannot close this notice without a final word concerning the memoir itself as a work of art. What we wish to know of great men is not only their achievements, but also all, even the trivial details of their daily life; for these, more than aught else, show character. All things, great and small, must be brought together into a living whole. This Geikie has done in a masterly way. Journals of petty daily occurrences, narratives of more continuous work, discussion of important scientific problems, letters on all kinds of subjects to all sorts of people, some full of weighty scientific matters, some full of fun and jokes and humorous verse, some full of deepest filial or conjugal affection—all these are skillfully woven into a vivid picture of the man as he really lived. Happy is the man who shall have such a biographer.

JOSEPH LE CONTE.

*A Text-Book of Invertebrate Morphology.* By J. PLAYFAIR McMURRICK, M. A., Ph. D. New York, Henry Holt & Co. 1894.

In preparing this book the author has followed the zoölogical method, and has given us a succinct though general account of the morphology of the different 'types,' classes and orders of the animal kingdom; no special forms under each being described.

Speaking of the word 'type,' we much prefer the older terms, branch, sub-kingdom or phylum, to the rather meaningless word 'type;' the first and last terms being naturally suggested from the evolutionary point of view, the main sub-divisions of the animal genealogical tree being more

naturally referred to as branches or phyla. The increase in the number of 'types' from eight to twelve results from dividing the Vermes into several, such as the Platyhelminths, Nemathelminthes and Annelida, which the author regards as of the same rank as the Mollusca. The Arthropoda also, somewhat prematurely, we think, are divided into three types, viz.: Crustacea, Arachnida and Tracheata. That the division is somewhat artificial is indicated by the fact that *Limulus* is assigned to the Crustacea, though placed in an appendix, whereas it is plainly neither a genuine Crustacean nor a true Arachnid, and belongs to an independent phylum. And then if we begin thus to manufacture 'types' out of the Arthropoda and out of the Vermes, we can scarcely end at the point the author reaches.

In agreement with some German authors, the Echinodermata, written Echinoderma, are interpolated between the highly specialized Tracheata and the Protochordata. This seems to us in a text-book of this sort a shade objectionable, when we consider how closely allied to the lower worms, both in embryology and in some points in their adult structure, Echinoderms are. Of course this is a matter of individual opinion, but we should look for some expression of the reasons why they are placed so far away from worms, in a situation between such closely circumscribed and specialized groups as insects, and the Chordata. If the position assigned the Echinoderms is due solely to the resemblance of the *Tornaria* larvæ of *Balanoglossa* to the larvæ of Echinoderms, this seems a rather slight reason.

While the descriptions of the types and classes are evidently clear and accurate; though not always presented in simple Saxon words, the salient points of resemblance or difference do not seem in all cases successfully brought out. Thus in writing

of the Brachiopoda the author speaks of the bivalved shell, 'similar to that of a bivalve mollusk,' but he does not add that the shells are dorsal and ventral, a point in which they differ from any mollusk. On p. 271 it is stated that eyes do not occur in these animals, meaning, of course, the adults, though on the next page the young *Argiope* is credited with eye-spots; the fact, however, that they occur in the larva of *Thecidium* not being mentioned. In the bibliography the papers of Morse on the development of *Terebratulina* and of Kowalevsky on *Argiope*, *Thecidium*, etc., are omitted, although the lower half of the page is left blank, and there was abundant room for the titles.

The treatment of the mollusca is in some respects unsatisfactory, though the anatomical details appear to be correctly and carefully stated. We should decidedly differ from the view that Lamellibranchs, or Pelycypoda, as it is now the fashion to call them, though the name is not nearly so apt or generally applicable as the older term, are intermediate between the Gastropoda and Cephalopoda. They have no head, and it seems much more natural to suppose that they have more or less directly descended from the Amphineura. The position assigned them by Gegenbaur, next above the last named group and below the Cephalophora, seems to us to be a more natural one. And speaking of the last named group, it is a pity that there should not be more figures of these obscure generalized forms, especially of the ladder-like nervous system of the different genera to show their relationship to *Chiton*, though the discussion of their affinities is excellent. In speaking of the Gastropods the use of the clumsy German term 'visceral hump' seems objectionable; we should prefer to call it the visceral mass. The visceral 'hump' in a Cephalopod is in reality all of the body behind the head.

The definitions or diagnoses of the subdivisions of the 'types' placed at the end of each chapter are too brief or defective and not always, it seems to us, happily worded. In those of the Gastropoda and Cephalopoda, the fact that they have a well differentiated head is not mentioned, though the 'visceral hump,' if the student clearly understands what that is, is said to be well developed.

The same lack of completeness applies to the diagnoses of the Crustacea, and particularly to those of the insects, while those of the Arachnida are much better.

The Tracheata (myriopods and insects), as in some other recent works, are not treated with such detail and thoroughness, nor in the case of the present book, so carefully and accurately as the Crustacea. It appears to be wholly a compilation, and not the result of autoptic study. This is not the case in Siebold's excellent *Anatomy of the Invertebrates*, which, though published forty years ago, is still for Tracheata useful and reliable. Our author's account of the anatomy of insects is somewhat faulty and needs revision in numerous places.

The spiral band of the trachea is said to extend along the tube, whereas it is not continuous, but varies much in length and makes from one to four or five turns, a single tracheal branch thus having many such disconnected spiral bands.

The olfactory organs of the antennæ are not setæ alone, but the pits to which the author does not refer are far more numerous. The elements of the ovipositor are not situated on the 'last abdominal segment' (p. 414), while the cerci (p. 489) are not regarded by the author as equivalents of the jointed appendages, though they are obviously so, whatever may be said of the parts of the ovipositor. It is also a question whether the 'spring' of *Collembola* is not the homologue of the legs.

It is rather venturesome to say that in

butterflies and Diptera the thoracic segments seem to be reduced to two, etc., when three segments are easily observed. Vestigial mandibles are attributed to the sphinx, though the structures so called have been shown by Walter not to be such.

The chapter on the Protochordata is well prepared and illustrated. Why, however, *Rhabdopleura* and *Cephalodiscus* are, without apparent hesitation, regarded as belonging in this type, should, we think, be carefully explained, the chordate features being so slight compared with those of the Enteropneusta. One also is somewhat startled to find *Amphioxus* included in a work on invertebrate morphology when its structure and embryology associate it so intimately with the Chordata; and why it should be regarded as a lower or more generalized type than the Tunicata we do not understand. It has been the nearly universal opinion of anatomists that the lancelet is nearer to vertebrates than are the ascidians.

The figures are mostly diagrammatic, and carefully drawn, though often coarsely so. We should have preferred, in many cases, exact and not schematic representations. The figures of *Buccinum undatum*, as regards the shell, reminds us more of a *Strombus*; and the figure of *Nautilus* should have been credited to Owen; several of the figures are credited to Leunis, and not to the original author or artist. The style cannot always be said to be simple and clear; the tendency being towards the use of long words requiring close attention in the beginner. The typography is fair and there is a praiseworthy absence of typographical errors. But whatever we have said by way of criticism, we desire to commend the book as excellent in its general plan and treatment, usually reliable, and forming a useful manual of the subject.

A. S. PACKARD.

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*The Land-Birds and Game-Birds of New England.* By H. D. MINOT. 2d edition, edited by William Brewster. Houghton, Mifflin & Co., April, 1895, 8°, pp. xxiv + 492, outline figures. Price, \$3.50.

Eighteen years have passed since the first appearance of Minot's 'Land-Birds and Game-Birds' (published in February, 1877). It had a good sale and was soon out of print. Practically the whole book was original—the descriptions of the birds, nests and eggs, and the biographies. The latter are based on the author's own field experience and are interesting, truthful, and in the main well written.

The body of the work is followed by an appendix comprising a bird calendar for eastern Massachusetts, and keys to the Land Birds of New England and the eggs of Massachusetts birds. These keys are based primarily on color and are not likely to prove of much value.

The personality of the author deserves a word. When only a boy of seventeen he had amassed a large quantity of field notes and had written the book now under review. As the editor of the new edition says in his preface: "The author had a clear head, a true heart, and a well-defined purpose, combined with an amount of literary taste and ability very rare in one so young. He was deeply in earnest, full of warm yet reverential love of nature, wholly unconscious of or indifferent to certain conventional methods of investigation and expression, yet in the main careful in observation, temperate of statement, and singularly logical and dispassionate in argument." In his thirtieth year he was chosen President of the Eastern Railroad in Minnesota, and soon after lost his life in an accident on another road.

The new edition is accompanied by a portrait of the author and is an attractive, well-printed volume. The editor, William Brewster, tells us that his 'editorial touches have been of the lightest.' He has substi-